

REMARKS

Claims 1-17 are currently pending in connection with the present application. Claims 1, 12 and 15 are independent claims.

PRIOR ART REJECTIONS

35 U.S.C. §102 Akram Rejection

Claims 12 and 14 stand rejected under 35 U.S.C. §102(b) as being anticipated by Akram et al. (U.S. Patent No. 6,082,365). Applicant respectfully traverses this rejection.

Akram discloses stackable semiconductor packages.¹ Each semiconductor chip package includes a semiconductor chip 220/320 connected to conductive traces 226/236 located on a flexible polymer tape 224/324 via bond pads 236 and 336. **The flexible polymer tape 224/324 is secured to opposing sides of support 230/330**, utilizing a dielectric adhesive 232/233.² The support 230/330 is formed of a material having heat sink properties (i.e., a metal or boron nitride loaded silicon, a ceramic ...).³ As shown in Fig. 4, a pair of stacked chip packages can be connected using bond pads 337 on the upper chip package to bond pad 238 provided on the lower chip package using solder balls 354. **The only substrate disclosed in Akram is substrate 250, to which the semiconductor chip packages are attached** via bond pads 237 on the semiconductor chip package and bond pads 252 on the surface of the substrate.⁴

With respect to claim 12, Applicant submits that Akram fails to teach “bending the flexible cable to extend around at least one side edge of the package” as recited in claim 12.

¹ Akram, Figures 3-4.

² Akram, Figures 3, 4 and Col. 8, Ins. 7-10 and 55-61.

³ Akram, Col. 8, Ins. 9-12.

⁴ Akram, Col. 8, ln. 59 – Col. 9, ln. 8.

Akram only discloses securing a flexible polymer tape 224/324 (having conductive traces 226/326) to opposing sides of the surface of a support 230/330, utilizing a dielectric adhesive 232/233. Applicant asserts that attaching a flexible polymer tape around **a support** differs from “extending the flexible cable to extend around at least one side edge of **the package**.”

Furthermore, Akram fails to teach “connecting pads under the AAT package are electrically connected to conductive patterns on the flexible cable.” Akram only discloses why terminal pads 236/237/336/337 and solder balls 240/340 to connect a pair of stacked packages. Whereas, the claimed connecting pad connect the package to the flexible cable.

Accordingly, Akram does not teach or suggest all of the features of claim 12. Therefore, Applicants submit that claim 12 is patentable. Furthermore, at least for the reason set forth above, claim 13-14 are patentable because they depend on claim 12.

35 U.S.C. §103 Akram/Bai Rejection

Claims 1-4, 7, 9, 11 and 16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Akram et al. (U.S. Patent No. 6,082,365), in view of Bai et al. (U.S. Patent No. 6,326,700). Applicants respectfully traverse this rejection.

On page 3 of the Office Action, the Examiner acknowledges that Akram is silent with regards to “there being a plurality of terminal pads and a plurality of connecting pads formed on the second face, and a semiconductor chip attached to the first face of the substrate and electrically connected to the terminal pads and the connecting pads as recited in claim 1.

(1) *Lack of Motivation to Combine References*

Applicants assert that the Examiner's alleged motivation is based upon Applicants' own disclosure and is therefore an improper use of hindsight. The Examiner merely viewed the present application, and attempted to select prior art containing methods packaging semiconductor chips, without citing specific evidence of motivation to combine the references, other than providing conclusory statements regarding the motivation and obviousness. Accordingly, absent such motivation, a prima facie case of obviousness under 35 U.S.C. §103(a) has not been established and the rejection must be withdrawn.

Applicants direct the Examiner's attention to two recent cases decided by the Court of Appeals for the Federal Circuit (CAFC), *In re Dembiczak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed.Cir. 1999) and *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed.Cir. 2000). Both of these cases set forth very rigorous requirements for establishing a prima facie case of obviousness under 35 U.S.C. §103(a).

To establish obviousness based on a combination of elements disclosed in the prior art, there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the Applicants. The motivation suggestion or teaching may come explicitly from one of the following:

- (a) the statements in the prior art (patents themselves)
- (b) the knowledge of one of ordinary skill art, or in some cases,
- (c) the nature of the problem to be solved.

See *Dembiczak* 50 USPQ at 1614 (Fed.Cir. 1999).

In order to establish a prima facie case of obviousness under 35 U.S.C. §103(a), the Examiner must provide particular findings as to why the two pieces of prior art are combinable.

See Dembiczak 50 USPQ2d at 1617. Broad conclusory statements standing alone are not "evidence".

Neither Akram nor Bai teach or suggest combining their features to arrive at independent claim 1; nor does the Examiner cite any particular passage to provide evidence that such a combination would be obvious to one of ordinary skill in the art. On the contrary, the disclosed references seek to overcome differing problems and therefore do not constitute an obvious combination.

Akram is directed to overcome the limitations associated with stack packaging of integrated circuits. In particular, the concerns related to stresses caused by differing coefficients of thermal expansion. Bai is directed at a low-profile semiconductor device mounted to substrate in such a way that the bonding wires are protected from exposure. A combination of Akram and Bai would not be obvious to one of ordinary skill in the art because such a combination would necessarily provide a high profile stacked-chip package with exposed bonding wires.

Given the distinct and differing problems solved by the references, neither reference provides any evidence teaching or suggesting their combination. Thus, it would not have been obvious to one of ordinary skill in the art to combine the teachings of Akram and Bai.

Relying on common knowledge or common sense of a person of ordinary skill in the art without any specific hint or suggestion of this in a particular reference is not a proper standard for reaching the conclusion of obviousness. *See In re Sang Lee*, 61 USPQ 2d 1430 (Fed. Cir. 2002).

Further, relying on obvious design choice as a reason for combining teachings of the various references is again not the proper standard for obviousness. If the Examiner is relying on personal knowledge to support a finding of what is known in the art, the Examiner must provide

an Affidavit or Declaration setting forth specific factual statements and explanation to support the finding. *See* 37 CFR 1.104(d)(2) and MPEP 2144.03(c). In view of the above arguments, Applicants assert that the Examiner has not established the required motivation for combining the teachings of Akram nor Bai and therefore fails to establish a prima facie case of obviousness under 35 U.S.C. §103(a).

(2) *Even if combinable, reference combination still fails to meet the claimed features.*

With respect to claim 1, Akram fails to teach “a substrate having a first face and a second face opposing the first face, there being a plurality of terminal pads and a plurality of connecting pads formed on the second face, and a semiconductor attached to the first face of the substrate and electrically connected to the terminal pads and the connecting pads; and at least one flexible cable having a plurality of conductive patterns thereon extending around at least one side edge of a lower one of the at least two packages, and electrically coupling the connecting pads of the packages through the conductive patterns”.

First, Akram only discloses mounting the entire stack of chip packages to a single substrate surface 250. **Akram does not teach a semiconductor package having any substrate.** Instead, Akram teaches that each package contains a “support” 230/330 around which a flexible tape 224/324 is connected using adhesive 232/233.⁵ Akram does not teach, suggest or render obvious the use of a substrate within a semiconductor package.

Second, assuming *arguendo* that support 230/330 may be a substrate, Akram would still not teach “a plurality of terminal pads and a **plurality of connecting pads formed**” **on any face of the substrate**, because (1) Akram does not teach connecting pad, and (2) none of the terminal

⁵ Akram, Figures 3 and 4, Col. 8, Ins. 8 and 61.

pads in Akram are formed on the substrate. Instead, Akram only discloses **terminal pads 236/237/238/336/337/338 formed on a flexible tape 224/324**.

Third, Akram does not disclose “at least one flexible cable having a plurality of conductive patterns thereon extending around at least **one side edge** of a lower one of at least two **packages**”, and “electrically coupling the connecting pads of the packages through the conductive patterns”. Instead, Akram teaches **a flexible tape wrapped around a support 230/330**.

Finally, even if Akram could be combined with Bai, Bai does not make up for the deficiencies of Akram disclosed above. Since Bai only teaches a single low-profile semiconductor package, any combination of Akram and Bai would necessarily employ Akram’s method of chip stacking to obtain stackable chip packages. Since Akram does not employ a substrate or a flexible cable having a plurality of conductive patterns extending around at least one side edge of a lower one of at least two packages, it follows that the combination of Akram and Bai would not result in an “area type package stack comprising ... a substrate ... and at least one flexible cable ... extending around at least one side edge of a lower one of the at least two packages”, as recited in independent claim 1. Therefore, neither Akram nor Bai, either alone or in combination, teach or suggest all of the features of independent claim 1.

Accordingly, Applicants submit that claim 1 is patentable. Furthermore, Applicants submit that claims 2-11, 16 and 17 are also patentable because they depend on patentable claim 1.

35 U.S.C. §103 Akram/Cady Rejection

Claims 15-17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Akram in view of Cady (U.S. Patent No. 6,576,998 B1). Applicants respectfully traverse this rejection.

With respect to claim 16 and 17, Applicants submit that the Examiner has failed to set forth the necessary justification to reject claims 16 and 17 based on the rejection of claim 15. Claim 16 and 17 depend on patentable independent claim 1. Therefore, Applicants submit that claims 16 and 17 are patentable, for the reasons set forth above.

With respect to claim 15, Applicants submit that Akram fails to teach “wherein connecting pads under the second package are electrically connected to the conductive patterns on the flexible cable”. As set forth above, Akram only teaches using terminal pads 236/237/336/337 and solder balls 240/340 to connect a pair of stacked semiconductor chip packages. Therefore, Akram cannot teach all of the features of claim 15.

Cady fails to make up for the deficiencies set forth above with respect to Akram, because Cady only teaches connecting multiple semiconductor packages using a flexible circuit to which the semiconductor packages are attached via solder balls 24 to a flexible circuit 30/32.⁶ Cady does not teach that “connecting pads under the package are electrically connected to conductive patterns on the flexible cable” as recited in Applicants’ claim 15.

In view of the above remarks, Applicants submit that claim 15 is patentable.

Therefore, withdrawal of the outstanding rejections is respectfully requested.

35 U.S.C. §103 Akram/Bai/Taniguchi Rejection

Claims 5, 6 and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Akram and Bai, in view of Taniguchi et al. (U.S. Patent No. 6,388,333). Applicants respectfully traverse this rejection.

⁶ Cady, Figures 1 and 2.

The Examiner admits that Akram and Bai fail to teach a “second wiring including vias electrical paths coupling the chip and the connecting pads”.

Applicants submit that claims 5, 6 and 17 are patentable because they depend on patentable independent claim 1, and Taniguchi fails to make up for the deficiencies discussed above with respect to Akram and Bai. Therefore, Applicants respectfully request that the outstanding rejection be withdrawn.

35 U.S.C. §103 Akram/Bai/Takashima Rejection

Claim 8 stand rejected under 35 U.S.C. §103 as being unpatentable over Akram and Bai in view of Takashima et al. (U.S. Patent No. 6,160,313).

The Examiner admits that Akram and Bai fail to teach “connecting pads that are arranged in a staggered row near an edge of a substrate”. Applicants submit that claim 8 is patentable because it depends on patentable independent claim 1, and Takashima fails to make up for the deficiencies discussed above with respect to Akram and Bai. Therefore, Applicants respectfully request that the outstanding rejection be withdrawn.

35 U.S.C. §103 Akram/Bai/Cady Rejection

Claim 10 stand rejected under 35 U.S.C. §103 as being unpatentable over Akram and Bai in view of Cady. Applicants respectfully traverse this rejection.

The Examiner admits that Akram and Bai fail to teach “a nonconductive adhesive layer interposed between adjacent lower and upper packages”.

Applicants submit that claim 10 is patentable because it depends on patentable independent claim 1, and Akram and Bai fail to make up for the deficiencies discussed above

with respect to Akram and Bai. Therefore, Applicants respectfully request that the outstanding rejection be withdrawn.

CONCLUSION

Accordingly, in view of the above amendments and remarks, reconsideration of the objections and rejections and allowance of each of claims 1-17 in connection with the present application is earnestly solicited.

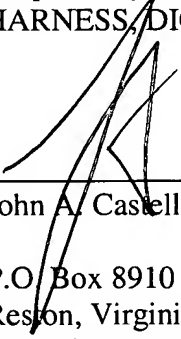
Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) hereby petition(s) for a one (1) month extension of time for filing a reply to the outstanding Office Action and submit the required \$120.00 extension fee herewith.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John A. Castellano at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,
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By



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